THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATION COUNCIL

DIPLOMA IN SECONDARY EDUCATION EXAMINATION

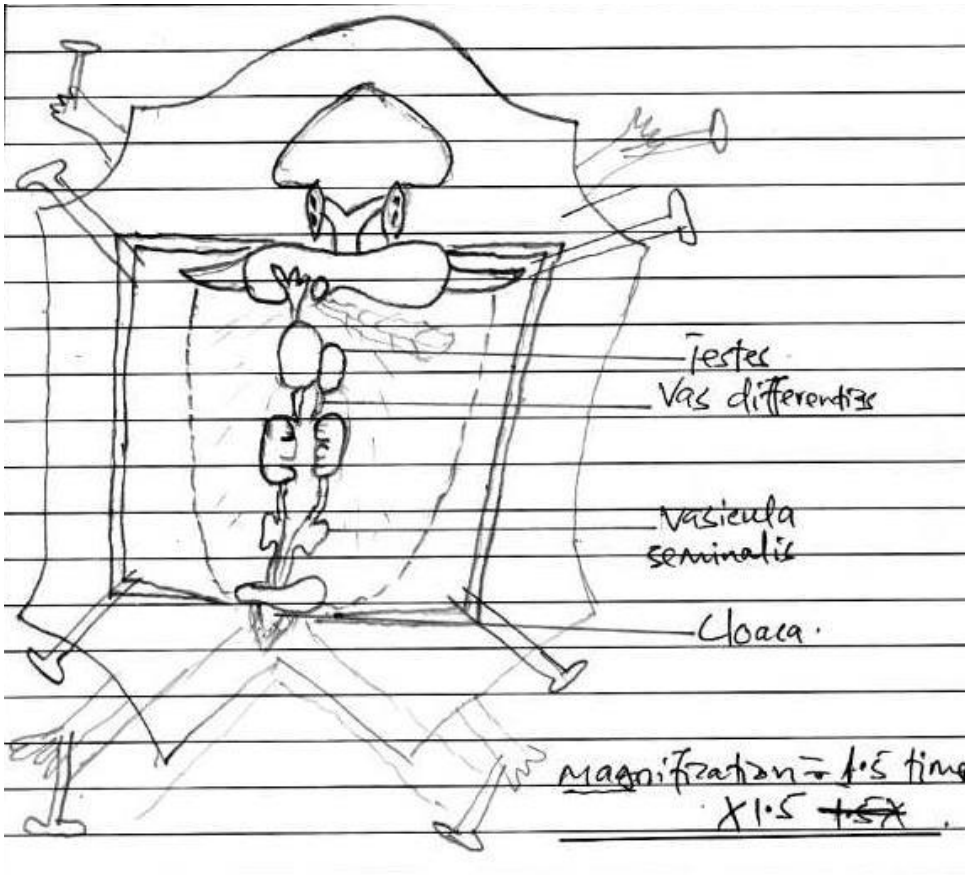
733/2A **BIOLOGY 2A**

Time: 3 Hour. **ANSWERS** **Year: 2010**

Instructions

1. This paper has three papers.
2. Answer **all** questions.
3. Question **1** contains 30 marks while question 2 and 3 have 10 marks each.
4. Mobile phones are not allowed inside the examination room.
5. Write your Examination Number on every page of your answer booklet.

1. **Dissect specimen A (a frog) and expose the digestive system.**
   (a) Draw and label seven parts related to digestion.



(b) What precautions must be taken while cutting the inner skin? Mention two.
The incision should be made gently and shallowly to avoid damaging the internal organs located just beneath the skin.
The specimen should be pinned properly to the dissection board to ensure it remains stable and to allow precise incisions for proper exposure of organs.

(c) Mention three digestion-related organs that differ between amphibians and mammals.
Amphibians have a simple stomach structure and shorter intestines compared to mammals, which have more complex and longer digestive tracts adapted for varied diets.
Mammals possess specialized teeth used in mechanical digestion, while frogs swallow food whole due to lack of teeth for chewing.
Frogs have a cloaca for elimination of both digestive and reproductive wastes, whereas mammals have separate openings for the digestive (anus) and reproductive systems.

2. You are given solution X.
(a) Perform biochemical food tests using appropriate reagents. Tabulate your results:

Food Tested	Procedure	Observation	Inference
Starch	Add iodine solution to the sample	Blue-black coloration formed	Starch is present
Reducing Sugar	Add Benedict's solution and boil in water bath	Orange-red precipitate formed	Reducing sugar is present
Protein	Add Biuret solution (NaOH and CuSO4)	Purple coloration observed	Protein is present
Lipid	Mix with ethanol, then add water and shake	Cloudy white emulsion formed	Lipid is present

(b) State two biological roles for each identified food substance.
Starch serves as an energy storage material and provides glucose for respiration.
Reducing sugars offer quick energy release during metabolism and act as building blocks for other biomolecules.
Proteins support tissue growth and repair, and also form enzymes, hormones, and immune cells.
Lipids are sources of long-term energy and are important for insulation and protection of organs.

(c) Why is heating required in Benedict's test?
Heating provides the activation energy needed for the reduction reaction between the reducing sugars and copper ions in the Benedict's solution. Without heat, the sugar would not reduce the blue copper(II) ions to form the colored precipitate, and no result would be observed.

3. Observe specimens R (Tilapia scale), S (Sisal), and T (Cactus).
(a) (i) What kingdom does specimen S belong to? Give two features.
Specimen S belongs to the Plantae kingdom. It exhibits autotrophic nutrition through photosynthesis, and it has cell walls made of cellulose.

(ii) List three adaptations of specimen T to dry environments.
Specimen T has thick, fleshy stems that store water for survival during drought.
Its leaves are modified into spines to minimize water loss through transpiration.
It has extensive shallow root systems to absorb surface moisture quickly after rainfall.

(b) From which organism is R taken? State two roles of the scale.
Specimen R is a scale taken from a tilapia fish. It provides protection against physical injuries and predators. It also helps reduce friction as the fish moves through water.

(c) What class does specimen T belong to? Give three features.
Specimen T is classified under the class Dicotyledonae. It has branching leaf venation, a taproot system, and floral parts mostly in multiples of four or five.